S&H Form: PTO/SB/05 (12/97)

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 1405.1020

First Named Inventor or Application Identifier:

Hideyuki HIRANO et al.

Express Mail Label No.

jc658 U.S. PTO 09/559259 04/27/00

jc713 U.S. PTO 04/27/00

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Assistant Commissioner for Patents**
Box Patent Application
Washington, DC 20231

1. [X] Fee Transmittal Form
2. [X] Specification, Claims & Abstract ..... [Total Pages: 29]
3. [X] Drawing(s) *(35 USC 113)* ..... [Total Sheets: 8]
4. [X] Oath or Declaration ..... [Total Pages: 4]
   a. [X] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional with Box 17 completed)*
      i. [ ] DELETION OF INVENTOR(S)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
5. [ ] Incorporation by Reference (usable if Box 4b is checked)
   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. [ ] Microfiche Computer Program *(Appendix)*
7. [ ] Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Copy
   b. [ ] Paper Copy (identical to computer copy)
   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [X] Assignment Papers (cover sheet & document(s))
9. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
10. [ ] English Translation Document *(if applicable)*
11. [X] Information Disclosure Statement (IDS)/PTO-1449 [X] Copies of IDS Citations
12. [ ] Preliminary Amendment
13. [ ] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
14. [ ] Small Entity Statement(s) [ ] Statement filed in prior application, status still proper and desired.
15. [X] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [ ] Other:

17. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: ___/_____

18. CORRESPONDENCE ADDRESS

STAAS & HALSEY LLP
Attn: James D. Halsey, Jr.
700 Eleventh Street, N.W., Suite 500
Washington, DC 20001

Telephone: (202) 434-1500
Facsimile: (202) 434-1501

TITLE OF THE INVENTION

DATA MANAGEMENT METHOD

BACKGROUND OF THE INVENTION

Technical Field

The present invention relates to data management methods; particularly, it relates to data management methods wherein digital content is encrypted with special access information and distributed.

Description of Related Art

Electronic data in computer program software and electronic publishing materials is vended stored on magneto-optical disks (MO), digital video disks (DVD), floppy disks (FD), mini disks (MD) and other recording media. Electronic data thus is generally easy to copy, and illicit copies are frequently made. That copyrights on the software vendor and publisher end will be infringed and considerably hinder profits is therefore a worry.

The situation is the same with electronic data containing still image data and motion picture data distributed via the Internet, CATV and other networks: illicit copies are made frequently, consequently damaging copyright holders' profits.

For protecting so-called digital content, such as electronic data stored on the recording media described above and electronic data distributed via the variety of

networks, it has been the practice to encrypt the digital content using an encryption key, and the thus distributing the substantive data that has been encrypted.

Assuming, for example, that a user accesses a content distributor from his or her own personal computer, then downloads the digital content onto a hard disk, and thus uses the digital content: To start with, the user accesses a host computer and obtains a plug-in module for downloading. Thereafter, the user forwards, to the host computer, an in-use hard disk drive identification number, an in-use computer CPU identification number, and other identification information items unique to the user.

On the content distributor end, substantive data in which digital content is encrypted with a content key and authorization information in which the content key is encrypted with user-specific identification information, is sent to the user end.

On the user end, the encrypted substantive data that has been sent and the authorization information are recorded as is encrypted on the hard disk. When using the digital content, employing user-specific identification information such as the hard disk drive identification number, the authorization information is decrypted and the content key is thereby obtained. The digital content is decrypted with the content key and thus used.

Herein, when granting individual users the right to use the digital content, the encryption key for encrypting the digital content can be made common, and use privileges can be granted individually to users by encrypting a decryption key utilizing user-specific information different for every user.

Wherein data is distributed by the methods described above, the data distributor is required to forward separately the encrypted digital content and the authorization information serving as the decryption key for the encrypted digital content.

Further, on the user end, the encrypted digital content and the authorization information that have been forwarded have to be stored separately on the recording medium.

Consequently, if the authorization information is damaged during the course of being forwarded to the user end from the data distributor end, or if the authorization information is otherwise damaged or lost due to some mishap on the recording medium on the user end, the digital content will become unusable. This makes it necessary to go through a process for acquiring second-time authorization information.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a data management method that by encrypting and distributing

digital content prevents copyright infringement, and that prevents authorization information for decrypting the encrypted digital content from being damaged or otherwise lost.

A data management method according to the present invention comprises a step of preparing a substantive data file by encrypting a digital content to be distributed, a step of extracting a part of the digital content as sample data, and preparing sample data file by embedding, into the sample data, authorization information as invisible information containing information on a content key used as an encryption key when encrypting the digital content, and a step of preparing synthesized data by synthesizing the substantive data file with the sample data file.

When using the distributed digital content, this involves separating the authorization information from the sample data file, restoring the content key for decrypting the substantive data file from the authorization information, and decrypting the substantive data file into the original digital content by use of the content key for its use.

With this contrivance, the substantive data file is integrally synthesized with the authorization information embedded as the invisible information into the sample data file, thereby preventing a breakage and a loss of the

authorization information for decrypting the substantive data file. The data of the digital content can be distributed by circulating the synthesized data, whereby the system can be downsized.

The sample data may be image data contained in the digital content, on which at least one of image processing, resizing, compressing and a γ-compensation is executed.

Further, the sample data may be index data representing the substantive data file.

Further, the synthesized data may contain a plurality of substantive data files based on a plurality of digital contents, a plurality of sample data files corresponding to the plurality of substantive data files, and each of the sample data constituting the plurality of sample data files may be linked to the corresponding substantive data file among the plurality of substantive data files.

Moreover, the sample data file may be defined as structured data based on JPEG (Joint Photographic Experts Group) and MPEG (Motion Picture Experts Group), and the synthesized data may be prepared by additionally synthesizing the substantive data file with the sample data file by use of a format of the sample data file.

The authorization information may be what the content key is encrypted in such a way that at least one of user identification information, identification information on a

device incorporated into a computer employed by the user, identification information on a CPU mounted in the computer employed by the user and identification information peculiar to a recording medium for storing the digital content, serves as an encryption key. Further, the authorization information may also be what the content key is encrypted, with identification information common to a plurality of users serving as an encryption key. In addition, the authorization information may be what the content key is encrypted in such a way that at least one of identification information unique to a distributor of the digital content and identification information unique to an author of the digital content, serves as an encryption key.

The decryption key for decrypting the encrypted content key is common to the encryption key for executing the encryption, and may be a common key based on unique information transmitted and received between the user and the content distributor.

The distributor of the digital content may encrypt the content key by use of a secret key, and the user may decrypt the encrypted content key by use of a public key provided beforehand from the distributor of the digital content.

Furthermore, the sample data file may contain the number of times as invisible information with which the user

uses the digital content, and the invisible information may be rewritten each time the user uses the digital content.

The sample data file may further contain authorization information as invisible information which makes it feasible to control the number of uses, and the invisible information may be rewritten when the user uses the digital content over a predetermined number of times.

In that case, the invisible information may be rewritten when reading the substantive data file after decrypting the same data file or when the use of the digital content is finished.

The invisible information of the sample data file contains redundant information and thereby incorporates an error recovery function.

The system may be constructed so that a range of regeneration based on the invisible information of the sample data file is regulated when decrypting the substantive data file. A range of any one category of years, months, dates and hours for which the regeneration can be done based on the invisible information of the sample data file is regulated when decrypting the substantive data file.

From the following detailed description in conjunction with the accompanying drawings, the foregoing and other objects, features, aspects and advantages of the present

invention will become readily apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic configurational diagram of the present invention;

Fig. 2 is a schematic diagram of the configuration on the content administrator end;

Fig. 3 is a schematic diagram of the configuration on the content user end;

Fig. 4 is a theoretical depiction of an instance of content distribution;

Fig. 5 is a flowchart of an instance of content distribution;

Fig. 6 is a theoretical depiction of an instance of content use;

Fig. 7 is a flowchart for an instance of content use;

Fig. 8 is an explanatory diagram illustrating JPEG data structure; and

Fig. 9 is a configurational diagram illustrating an example of a management mode.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Outline of the Invention

Fig. 1 shows an outline of architecture according to the present invention.

A content provider **1** may be an author and a copyright holder of digital contents, and provides a content administrator **2** with a digital content **11** to be operated.

The content administrator **2** encrypts, for its operation, the digital content **11** provided from the content provider **1**. The content administrator **2** manages an encryption key thereof and also manages user information of a user who utilizes the digital content **11**.

A content user **3**, when trying to use the digital content managed by the content administrator **2**, transmits user information **14** to the content administrator **2**.

The content administrator **2** manages the user information **14** transmitted from the content user **3**, prepares content use authorization information **13** based on this item of user information **14**, and transmits the authorization information **13** combined with an encrypted content **12** to the content user **3**.

In this case, the content administrator **2** extracts such sample data as to represent its substance out of the digital content **11**. The content administrator **2** encrypts the encryption key, by which the digital content **11** has been encrypted, with the user information **14**, thereby preparing the content use authorization information **13**. The content administrator **2** prepares a sample data file by embedding the authorization information **13** as invisible information into

the sample data. Further, the content administrator **2** synthesizes this sample data file with the encrypted content **12**, and transmits the synthesized content to the content user **3**.

In that case, the content provider **1** may be identical in function with the content administrator **2**.

Content administrator

Reference is made to Fig. 2, a functional block diagram schematically depicting configuration on the content administrator **2** end. The system on the content administrator **2** end includes: a content administration module **21** for managing the content to be run; a content encryption unit **22** for encrypting the digital content by use of predetermined content keys; a content key administration unit **23** for administrating content keys; a user information administration module **24** for obtaining the user information form a content user **3** and administrating this item of user information; an authorization information administration module **25** for preparing user authorization information for the digital content on the basis of the user information administered by the user information administration module **24** to administer the information; a authorization-information-embedded sample preparing unit **26** for extracting sample data from the digital content and embedding the authorization information as invisible information into the

sample data; and an encrypted content synthesizing unit **27** for synthesizing the authorization information embedded sample data with the encrypted content encrypted by using the content key.

Content User

Reference is made next to Fig. 3, a functional block diagram schematically showing a configuration on the side of the content user **3**.

The system on the content user **2** end includes: a user information administration module **31** for managing identification numbers of in-use hard disk drives; an identification number of a CPU incorporated into a computer and other items of identification information unique to users; a synthesized data acquisition unit **32** for acquiring synthesized data from the content administrator **2**; a sample data display unit **33** for displaying sample data from the acquired synthesized data; an authorization information extracting unit **34** for separating the authorization information from the authorization-information-embedded sample data; a content key decryption unit **35** for regenerating the content key by decrypting the extracted authorization information; a content decryption unit **36** for decrypting the encrypted content by use of the decrypted content key; and a content running unit **37** for running the decrypted digital content.

Distribution of Content

An operation performed by the content administrator **2** when distributing the digital content will be described based on Fig. 4 and 5.

The digital content **11**, into which content information **42** thereof is embedded as a watermark, turns out to be a watermarked content **43**. Herein, the content **11** may be structured so that the content information **42** is inserted into a specified frequency band of the data, and may also be structured so that a part of the data is thinned out and the content information **42** is inserted therein. The content information **42** may be set as, e.g., information on the copyright of the digital content **11**, and the embedding of such an item of information may be omitted.

In step S1, the watermarked content **43** is encrypted by use of a content key **44**, thereby preparing an encrypted content **45**.

The user information **14** is acquired in step S2. Herein, if accessed from the content user **2**, items of identification information unique to the content user **3** such as the identification number of the hard disk drive used by the content user **2** and the identification number of the CPU mounted in the computer, are transmitted and stored in the user information administration module **24** (see Fig. 2).

In step S3, the content key **44** is encrypted by using the acquired user information **14**, and a secret key **46** is prepared. This secret key **46** is encrypted based on the user information **14** unique to the content user **3**, and therefore serves as authorization information by which the digital content **11** is allowed to be used.

Data representing the content is extracted as sample data **41** out of the digital content **11** in step S4. If the digital content **11** contains plural items of image data, one item of image data among them may be extracted as the sample data **41**. In the case of simultaneously operating the plurality of digital contents **11**, the system can be constructed so that the sample data **41** extracted herein is linked to the digital content **11** corresponding thereto, and a desired item of sample data among plural items of sample data is selected, thus choosing the digital content to be used.

In step S5, the secret key **46** is embedded as a watermark into the sample data **41**, thereby preparing watermarked sample data **47**. The watermarked sample data **47** may be, as in the manner described above, structured so that the data of the secret key **46** is inserted into a specified frequency band of the data, and may also be structured so that a part of the data is thinned out and the data of the secret key **46** is inserted therein. With this design, it

follows that there is prepared the authorization information embedded sample data into which the authorization information is embedded as invisible information.

Synthesized data **48** is prepared by synthesizing the encrypted content **45** with the watermarked sample data **47** in step S6.

In a case where the digital content **11** is composed of plural items of image data, the data may be distributed by setting the sample data in a structured data format based on a standards group such as JPEG (Joint Photographic Experts Group). In this case, the sample data **41** is paired with the digital content **11**, and the authorization information is embedded therein per content, thus preparing the watermarked sample data **47**. Then, the digital content **11** is additionally synthesized with the sample data **47**.

Fig. 8 shows a JPEG data structure in that case. The watermarked sample data **47** is structured as a sample data file **61** consisting of a Start Of Image (SOI) point **63**, an End Of Image (EOI) point **65**, and a frame **64** interposed between the start point **63** and the end point **65**. Further, a substantive data file **62** is configured by a digital content **66** encrypted by the content key **44**, and this sample data file **61** and the substantive data file **62** are integrally synthesized.

The synthesized data **48** is transmitted in response to a request of the content user **3** in step S7. In the case of distributing the data via a variety of networks, it follows that the synthesized data **48** is transmitted via those networks but may also be distributed in a form of being recorded on a CD-ROM, a DVD and other recording media.

Use of Content

An operation in a case where the content user **3** uses the digital content distributed thereto, will be discussed based on Fig. 6 and 7.

The synthesized data **48** is obtained from the content administrator **2** in step S21. In that case, the content user **3** accesses beforehand the content administrator **2** and notifies the content administrator **2** of a purport that the user **3** uses the digital content managed by the content administrator **2**, and it is assumed that the user information **14** unique to the user has been forwarded to the content administrator **2**. The synthesized data **48** may take a form of its being obtained by downloading the data via the variety of networks, and may also take such a form as to be obtained through a distribution from the content administrator **2** in a state of being recorded on the recording medium. The synthesized data **48** obtained is stored on the hard disk and other recording medium employed by the content user **3**.

In step S22, a watermarked sample data **50** in the synthesized data **48** is displayed. If the synthesized data **48** contains a plurality of digital contents, items of watermarked sample data **47** corresponding to the respective digital contents may be arranged in reduction and sequentially displayed by scrolling and switching, whereby a catalog display function can be given. Software of a client may be provided with this kind of function. Even when only one digital content exists within the synthesized data **48**, the system may also be constructed so that the sample data file is structured by extracting some items of sample data and displayed in catalog. As a matter of course, in the case of a single item of sample data, the system may be constructed so that the single data is displayed as it is.

It is judged in step S23 whether or not there is a use request given from the content user **3**. When the content user **3** selects a specified item of sample data and gives an indication of using the same data on the display of the watermarked sample data **50**, the process flow goes to step S24, in which content using software is operated.

The authorization information is separated from the watermarked sample data **47** in the synthesized data **48** in step S24. Herein, the secret key **46** embedded as a watermark into the watermarked sample data **47**, is de-embedded. If the secret key **46** is embedded as a frequency component of the

sample data, the secret key **46** can be de-embedded by analyzing the frequency of the watermarked sample data **47**. Further, in the case of implementing physical embedding such as embedding the watermark after thinning out the sample data, the secret key **46** can be de-embedded by performing an image analysis.

In step S25, the de-embedded secret key **46** is decrypted by use of the user information **14**, the content key **44** is regenerated.

In step S26, the encrypted content **45** is decrypted by use of the regenerated content key **44**, and the watermarked content **43** is developed on the hard disk and/or IC memory.

The content is utilized by actually operating the watermarked content **43** in step S27.

Mode of Data Operation

An operation mode as shown in Fig. 9 may be taken.

A content provider **51** may be an author and a copyright holder of digital contents, and provides a content administrator **52** with a digital content (A).

The content administrator **52** encrypts the digital content provided from the content provider **51** by use of a content key.

The content administrator **52** transmits the encrypted digital content and the content key to a center **53** for actually distributing the data (B). The center **53** manages

the encrypted digital content and the content key. The center **53** may be a WEB server within the Internet and a variety of other networks, and is constructed so as to distribute the digital content in response to access from a user **54**.

The user **54** accesses the center **53** via a WEB browser, and acquires a plug-in module for obtaining the data (C). The user **54** starts up the plug-in module on the WEB browser, and forwards to the center **53** identification information unique to the user such as an identification number of the hard disk drive employed by the user himself or herself (D).

The center **53** prepares the authorization information by encrypting the content key on the basis of the identification information unique to the user, and embeds the authorization information as a watermark into the sample data of the digital content. The center **53** then prepares a authorization information embedded encrypted content by synthesizing the sample data with the encrypted content. The center **53** transmits the authorization information embedded encrypted content to the content user **54** (E).

The content user **54** stores the received authorization information embedded encrypted content in a user's disk **55** such as a hard disk (F).

When utilizing the digital content, the content key is taken out of the authorization information embedded

encrypted content stored in the user's disk **55** by use of the identification information unique to the user (G), and decrypts the encrypted content by the content key, thus taking out the digital content (H).

Such a system architecture being thus made, there is no necessity for changing the content key for encrypting the digital content for every content user, and one single content key suffices for one digital content, thereby facilitating the management of the encryption key. Further, a security of the authorization information is kept by the identification information peculiar to the content user, and a fraudulent use of the digital content can be prevented. Moreover, the authorization information is integrally embedded into the encrypted content, and hence the procedure of transferring and receiving the key is simplified, which might eliminate a possibility of the key for decrypting the encrypted content being lost or broken and is no time-consuming of reissuing the key.

Other Embodiments

(A) The recording medium, stored with the synthesized data obtained by the content user **2**, on which the synthesized data is decrypted and developed, may include, in addition to the hard disk, an MO, a ZIP, a DVD, an IC memory and those in other forms. In that case, IDs of those devices may be used as the user information **14**.

(B) Further, in the case of such a mode that the digital content is recorded on the recording medium such as the CD-ROM and the DVD and thus distributed, a content ID and a medium identification number written within a package may also be sued as the user information **14**.

(C) The system may also be constructed in such a way that the authorization information embedded into the watermarked sample data **47** contains a data field for recording the number of times with which the content user **2** decrypts and uses the digital content. In this case, if trying to use the content over a predetermined number of times, the system can be contrived to regulate this action. The system may also be constructed so that the number of times to use the content is updated when reading and decrypting the encrypted content or when finishing the use of the digital content, and, with this updated number serving as invisible information, the watermarked sample data **47** is rewritten.

(D) The system may be constructed in such a manner that the authorization information embedded into the watermarked sample data **47** contains a data field for recording the user information **14**. In this case, an illicit copy of the digital content and a fraudulent circulation thereof can be prevented.

(E) The authorization information embedded into the watermarked sample data **47** may be structured as redundant information repeated a plurality of times. This enables the system to be given an error recovery function and makes it feasible to prevent a loss of the secret key **46** based on the authorization information.

(F) The authorization information embedded into the watermarked sample data **47** can be structured so as to regulate a range of any one category of years, months, dates and hours for which the regeneration can be done. In this case, the illicit cope of the digital content and the fraudulent circulation thereof can be prevented.

(G) The authorization information embedded into the watermarked sample data **47** can be structured so as to control the number of uses. In this case, the illicit cope of the digital content and the fraudulent circulation thereof can be prevented.

According to the present invention, the sample data filed containing the authorization information is integrally synthesized with the substantive data file of the encrypted digital content, and the synthesized data is distributed. Hence, there is no necessity for transferring and receiving the key for decrypting the substantive data file separately from the substantive data file. Further, the user does not have any necessity for managing the substantive data file

and the key separately, and therefore it never happens that the key for decrypting the substantive data file is lost, with no time-consuming process of reissuing the key.

The authorization information is embedded as the invisible information into the sample data, and hence high security is maintained.

While only selected embodiments have been chosen to illustrate the present invention, to those skilled in the art it will be apparent from this disclosure that various changes and modifications can be made herein without departing from the scope of the invention as defined in the appended claims. Furthermore, the foregoing description of the embodiments according to the present invention is provided for illustration only, and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

What is claimed is:

1. A data management method comprising:

preparing a substantive data unit by encrypting digital content that is for distribution;

extracting a portion of the digital content as sample data, and preparing a sample data unit wherein authorization information containing information for a content key employed as an encryption key when encrypting the digital content is embedded as invisible information; and

preparing synthesized data wherein the substantive data unit and the sample data unit are synthesized, and distributing the synthesized data.

2. The data management method set forth in claim 1, wherein use is enabled by separating the authorization information from the sample data unit, restoring the content key for decrypting the substantive data unit from said authorization information, and employing the content key to decrypt the substantive data unit into the original digital content.

3. The data management method set forth in claim 1, the sample data being image data wherein at least one process among image processing, resizing, compressing and a γ-compensation is executed on image data contained in the digital content.

4. The data management method set forth in claim 1, wherein the sample data is index data for representing the substantive data unit.

5. The data management method set forth in claim 4, wherein the synthesized data contains a plurality of substantive data units based on a plurality of digital content items, and contains a plurality of sample data units corresponding to the plurality of substantive data units; and wherein sample data constituting the plurality of sample data units is linked with respective corresponding ones of the plurality of substantive data units.

6. The data management method set forth in claim 1, wherein the sample data units are data structuralized in one of JPEG and MPEG formats, and

the synthesized data is prepared by add-on synthesizing the substantive data unit to the sample data unit using the format of the sample data unit.

7. The data management method set forth in claim 1, the authorization information being information wherein the content key is encrypted, with the encryption key being at least one of user identification information, equipment identification information loaded in user-employed computers, CPU identification information loaded in user-employed computers, and identification information unique to digital-content-storing recording media.

8. The data management method set forth in claim 1, the authorization information being information wherein the content key is encrypted, with the encryption key being identification information common to a plurality of users.

9. The data management method set forth in claim 1, the authorization information being information wherein the content key is encrypted, with the encryption key being at least one of identification information unique to distributors of the digital content, and identification information unique to authors of the digital content.

10. The data management method set forth in claim 7, wherein a decryption key for decrypting the encrypted content key is in common with the encryption key for encrypting, being a shared key based on exclusive information transmitted and received among users and content distributors, using symmetric cryptography.

11. The data management method set forth in claim 8, wherein a decryption key for decrypting the encrypted content key is in common with the encryption key for encrypting, being a shared key based on exclusive information transmitted and received among users and content distributors, using symmetric cryptography.

12. The data management method set forth in claim 9, wherein a decryption key for decrypting the encrypted content key is in common with the encryption key for

encrypting, being a shared key based on exclusive information transmitted and received among users and content distributors, using symmetric cryptography.

13. The data management method set forth in claim 7, wherein the digital content distributors encrypt the content key employing a secret key, and the users decrypt the encrypted content key employing a public key provided in advance from the digital content distributors, using public-key cryptography.

14. The data management method set forth in claim 8, wherein the digital content distributors encrypt the content key employing a secret key, and the users decrypt the encrypted content key employing a public key provided in advance from the digital content distributors, using public-key cryptography.

15. The data management method set forth in claim 9, wherein the digital content distributors encrypt the content key employing a secret key, and the users decrypt the encrypted content key employing a public key provided in advance from the digital content distributors, using public-key cryptography.

16. The data management method set forth in claim 1, wherein the sample data unit comprises as invisible information a use count of times a user has used the digital

content; characterized in that the invisible information is rewritten each time a user uses the digital content.

17. The data management method set forth in claim 1, wherein the sample data unit comprises as invisible information authorization information to enable use count control; characterized in that the invisible information is rewritten when a user uses the digital content a predetermined number of times and more.

18. The data management method set forth in claim 16, characterized in that the invisible information is rewritten on decrypting and reading the substantive data unit.

19. The data management method set forth in claim 16, characterized in that the invisible information is rewritten when use of the digital content is ended.

20. The data management method set forth in claim 17, characterized in that the invisible information is rewritten on decrypting and reading the substantive data unit.

21. The data management method set forth in claim 17, characterized in that the invisible information is rewritten when use of the digital content is ended.

22. The data management method set forth in claim 16, wherein the invisible information in the sample data unit comprises an error recovery function by containing redundant information.

23. The data management method set forth in claim 16, characterized in that limits on read-out and use in decrypting the substantive data unit are governed based on the invisible information in the sample data unit.

24. The data management method set forth in claim 16, characterized in that one of year, month, date, and time limits within which read-out and use is possible in decrypting the substantive data unit are governed based on the invisible information in the sample data unit.

ABSTRACT

A data management method that by encrypting and distributing digital content prevents copyright infringement, and that prevents authorization information for decrypting the encrypted digital content from being damaged or otherwise lost. Encrypted content **45** is prepared by encrypting digital content **11** with a content key **44**. A portion of the digital content **11** is extracted as sample data **41**. A secret key **46**, by which the content key **44** is encrypted with user information **14**, is embedded as invisible information into the sample data **41**, thus preparing watermarked sample data **47**. The watermarked sample data **47** is synthesized with the encrypted content **45** to form synthesized data **48**. The synthesized data **48** is distributed.

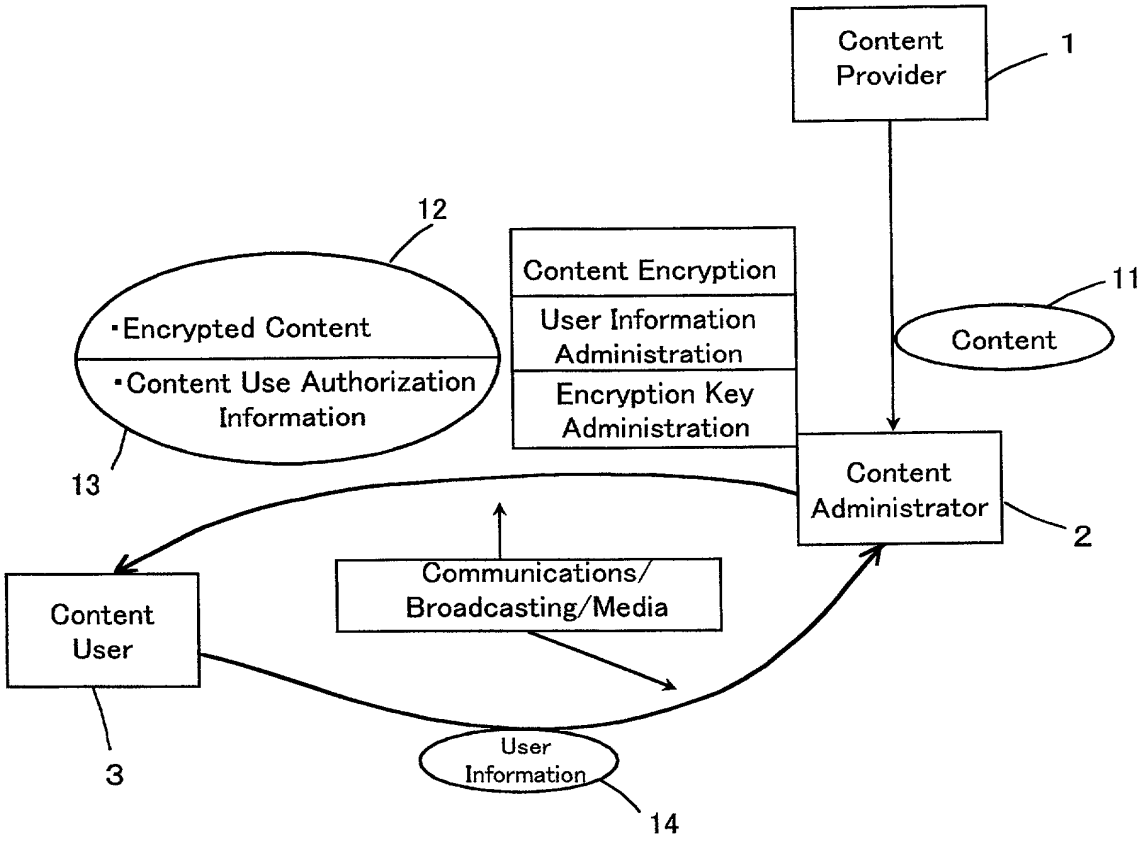


Fig. 1

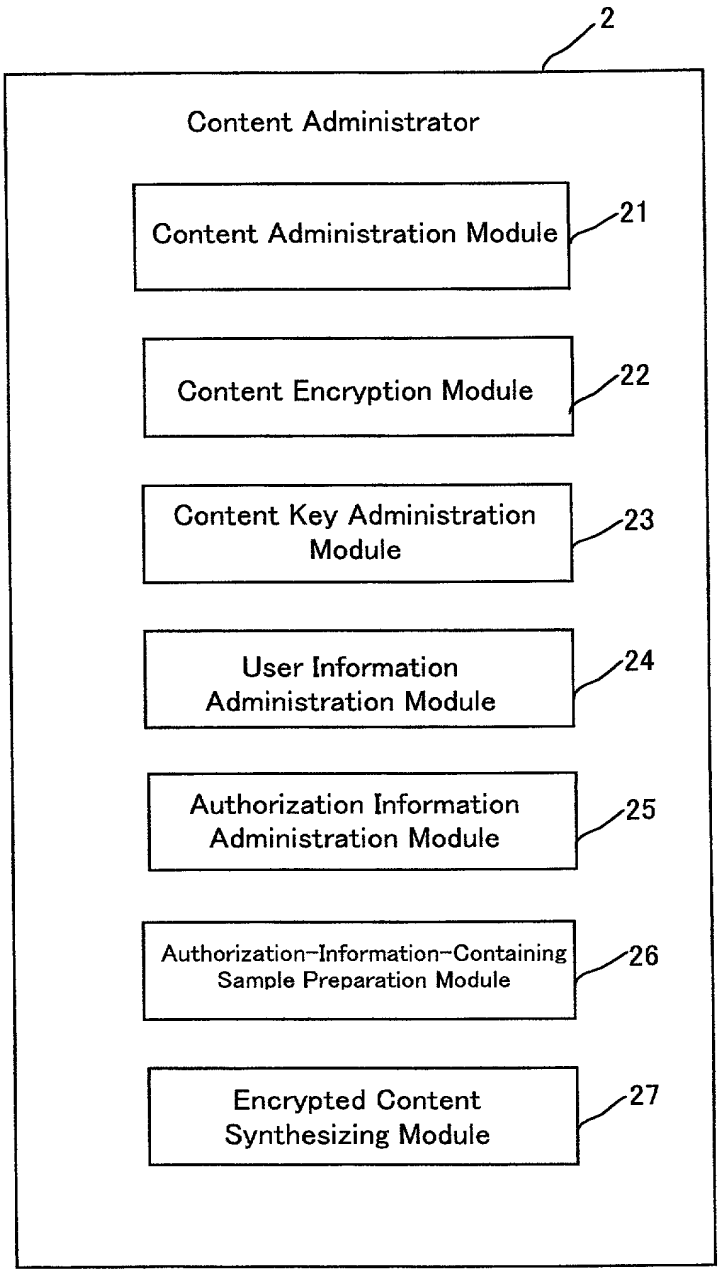

2
Content Administrator
Content Administration Module
21
Content Encryption Module
22
Content Key Administration Module
23
User Information Administration Module
24
Authorization Information Administration Module
25
Authorization-Information-Containing Sample Preparation Module
26
Encrypted Content Synthesizing Module
27

Fig. 2

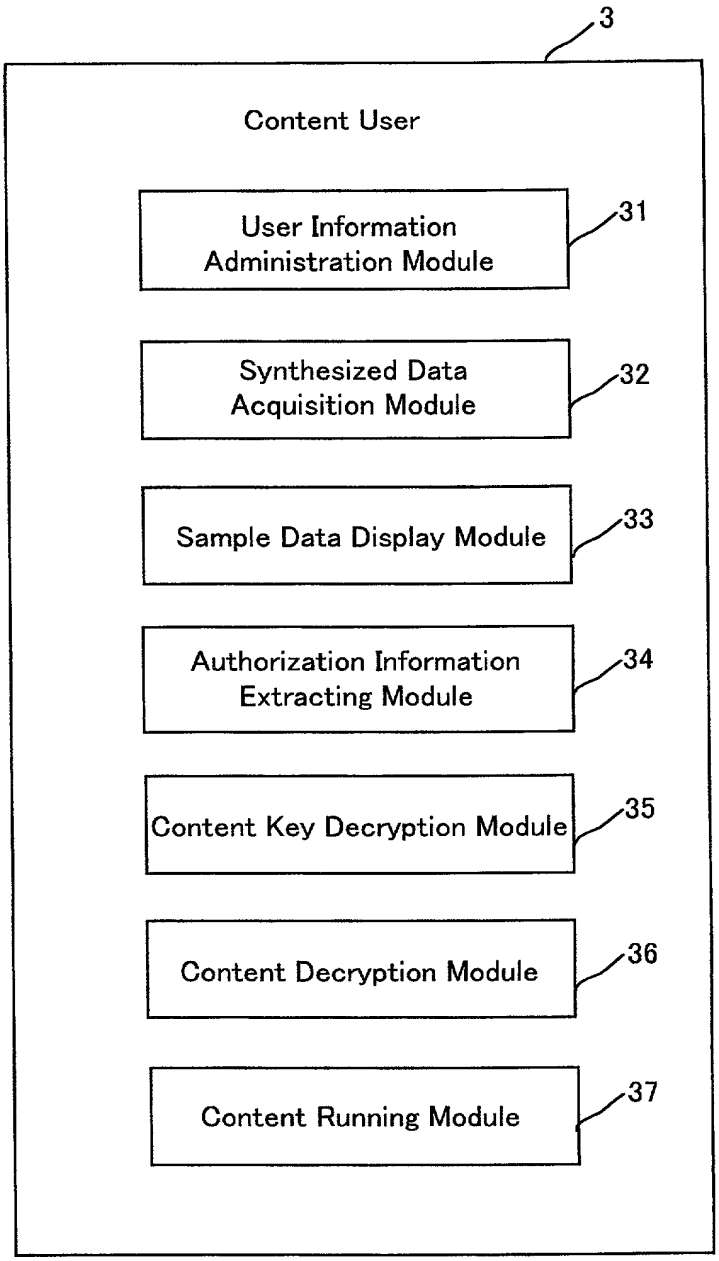

3
Content User
User Information Administration Module
31
Synthesized Data Acquisition Module
32
Sample Data Display Module
33
Authorization Information Extracting Module
34
Content Key Decryption Module
35
Content Decryption Module
36
Content Running Module
37

Fig. 3

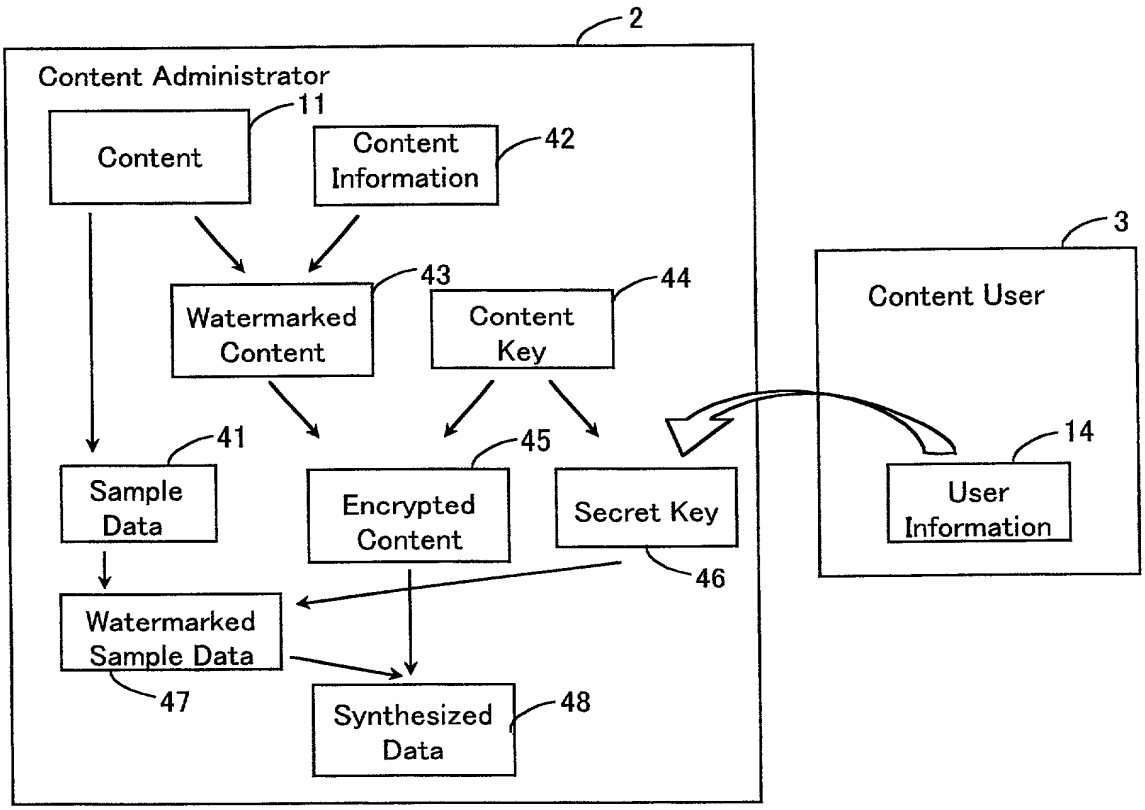

2
Content Administrator
11
Content
Content Information
42
3
Content User
43
Watermarked Content
44
Content Key
41
Sample Data
45
Encrypted Content
Secret Key
14
User Information
46
Watermarked Sample Data
47
Synthesized Data
48

Fig. 4

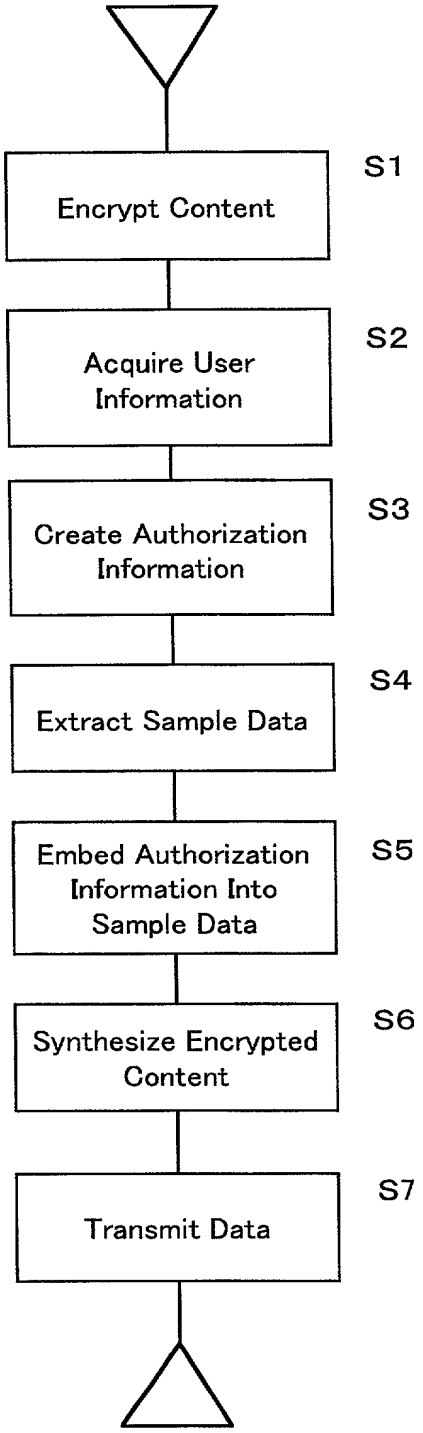
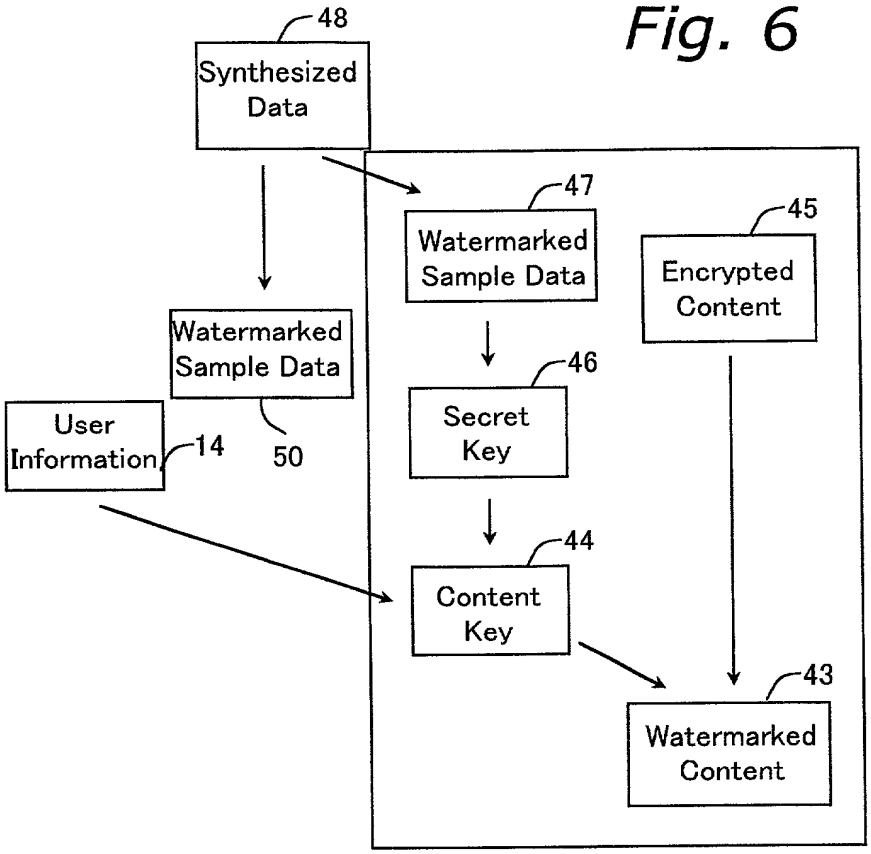

Encrypt Content
S1
Acquire User Information
S2
Create Authorization Information
S3
Extract Sample Data
S4
Embed Authorization Information Into Sample Data
S5
Synthesize Encrypted Content
S6
Transmit Data
S7

Fig. 5

Fig. 6


48
Synthesized Data
47
Watermarked Sample Data
45
Encrypted Content
Watermarked Sample Data
46
Secret Key
User Information
14
50
44
Content Key
43
Watermarked Content

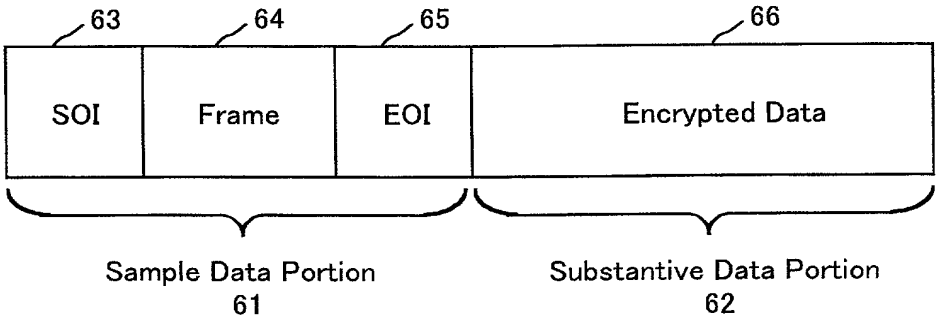

63
64
65
66
SOI
Frame
EOI
Encrypted Data
Sample Data Portion
61
Substantive Data Portion
62

Fig. 8

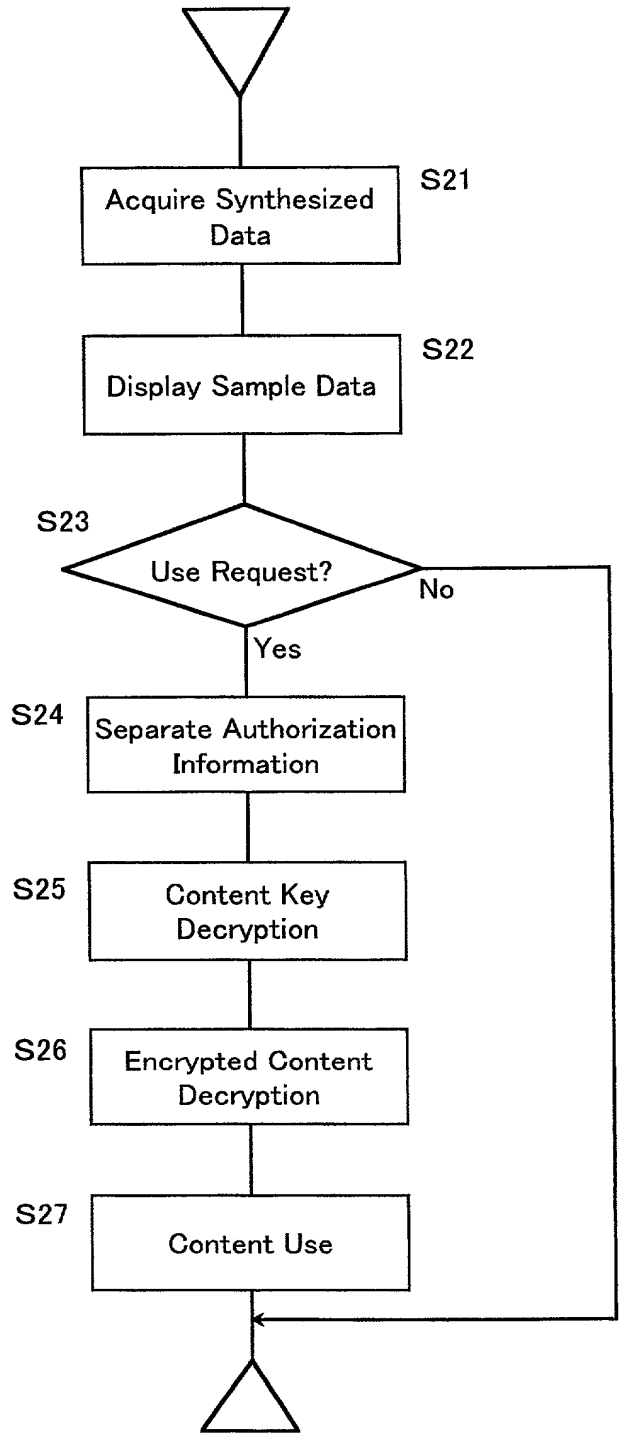

Acquire Synthesized Data
S21
Display Sample Data
S22
S23
Use Request?
No
Yes
S24
Separate Authorization Information
S25
Content Key Decryption
S26
Encrypted Content Decryption
S27
Content Use

Fig. 7

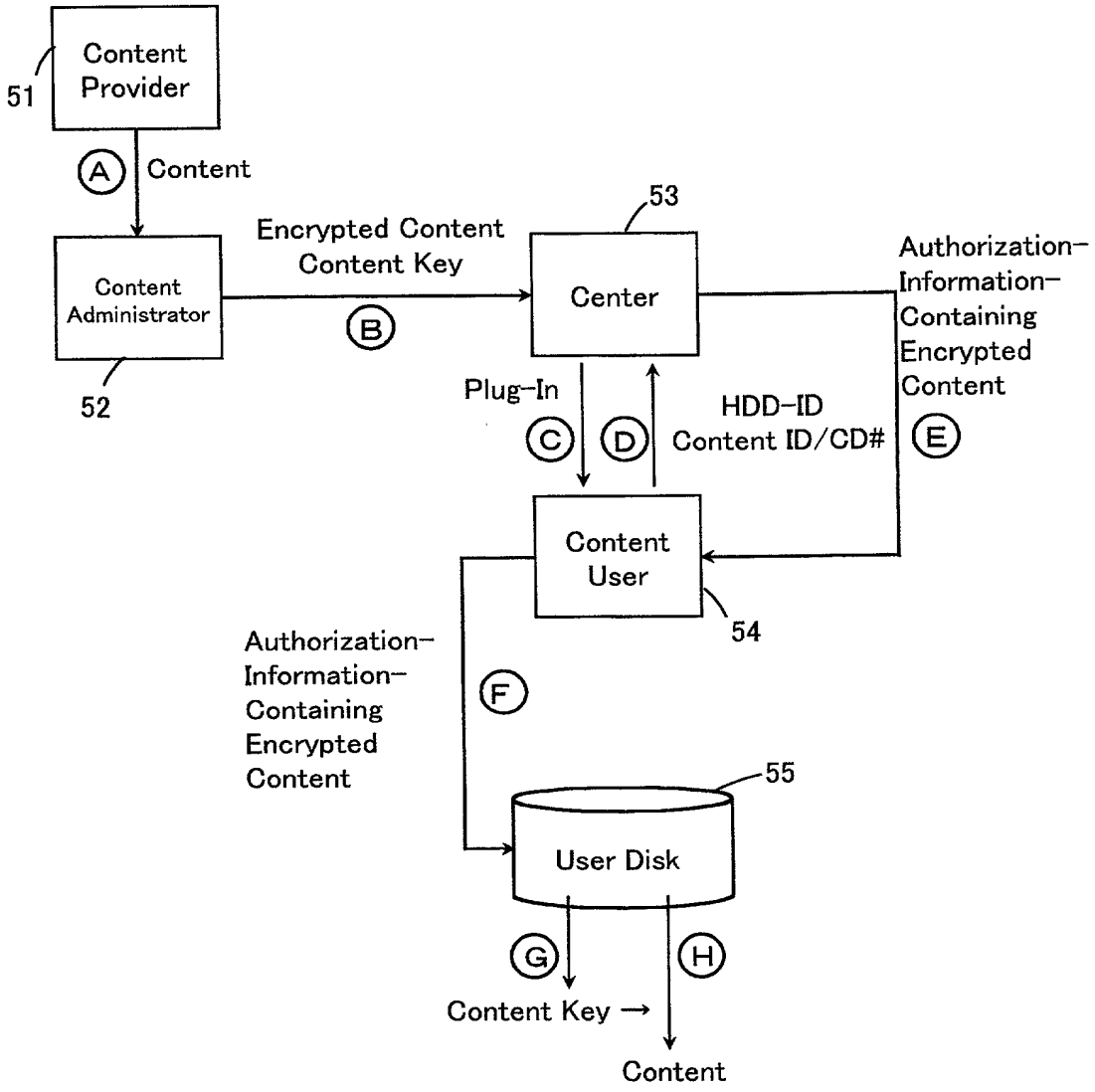

Content Provider
51
A
Content
Content Administrator
52
Encrypted Content
Content Key
B
53
Center
Authorization-Information-Containing Encrypted Content
E
Plug-In
C
D
HDD-ID
Content ID/CD#
Content User
54
Authorization-Information-Containing Encrypted Content
F
55
User Disk
G
H
Content Key
Content

Fig. 9

PTO/SB/106 (8-96)
Approved for use through 9/30/98. OMB 0651-0032
Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DATA MANAGEMENT METHOD

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ __月__日に提出され、米国出願番号または特許協定条約国際出願番号を_____とし、
（該当する場合）_____ に訂正されました。

☐ was filed on _____
as United States Application Number or
PCT International Application Number
_____ and was amended on
_____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第３７編第１条５６項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Japanese Language Declaration
(日本語宣言書)

私は、米国法典第３５編１１９条(a)-(d)項又は３６５条(b)項に基き下記の、米国以外の国の少なくとも一ヵ国を指定している特許協力条約３６５(a)項に基ずく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)
外国での先行出願

(Number) (番号)	(Country) (国名)	(Day/Month/Year Filed) (出願年月日)	Priority Not Claimed 優先権主張なし
11-147769	Japan	27/05/99	☐
			☐

私ここに、第３５編米国法典１１９条(e)項に基いて下記の米国特許出願規定に記載された権利をここに主張いたします。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Filing Date) (出願日)	(Application No.) (出願番号)	(Filing Date) (出願日)

私は、下記の米国法典第３５編１２０条に基いて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約３６５条(c)に基ずく権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第３５編１１２条第１項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第３７編１条５６項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Application No.) (出願番号)	(Filing Date) (出願日)	(Status: Patented, Pending, Abandoned) (現況：特許許可済、係属中、放棄済)

私は、私自身の知識に基ずいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じるところに基ずく表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第１８編第１００１条に基ずき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行なえば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに下記のごとく宣誓を致します。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

PTO/SB/106 (8-96)
Approved for use through 9/30/96. OMB 0651-0032
Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Japanese Language Declaration
(日本語宣言書)

委任状： 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。（弁護士、または代理人の氏名及び登録番号を明記のこと）

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith *(list name and registration number)*

James D. Halsey, Jr., 22,729; Harry John Staas, 22,010; David M. Pitcher, 25,908; John C. Garvey, 28,607; J. Randall Beckers, 30,358; William F. Herbert, 31,024; Richard A. Gollhofer, 31,106; Mark J. Henry, 36,162; Gene M. Garner II, 34,172; Michael D. Stein, 37,240; Paul I. Kravetz, 35,230; Gerald P. Joyce, III, 37,648; Todd E. Marlette, 35,269; Harlan B. Williams, Jr., 34,756; George N. Stevens, 36,938, Michael C. Soldner, 41,455; Norman L. Ourada, 41,235; Kevin R. Spivak, P-43,148; and William M. Schertler, 35,348 (agent)

書類送付先

Send Correspondence to:

STAAS & HALSEY
700 Eleventh Street, N.W.
Suite 500
Washington, D.C. 20001

直接電話連絡先： （名前及び電話番号）

Direct Telephone Calls to: *(name and telephone number)*

STAAS & HALSEY
(202) 434-1500

唯一または第一発明者名	Full name of sole or first inventor Hideyuki HIRANO
発明者の署名 日付	Inventor's signature Date Hideyuki Hirano April 21, 2000
住所 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8588, Japan	Residence c/o FUJITSU LIMITED
国籍	Citizenship Japan
私書箱	Post Office Address Same as above
第二共同発明者	Full name of second joint inventor, if any Seigo KOTANI
第二共同発明者 日付	Second inventor's signature Date Seigo Kotani April 21, 2000
住所 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8588, Japan	Residence c/o FUJITSU LIMITED
国籍	Citizenship Japan
私書箱	Post Office Address Same as above

（第三以降の共同発明者についても同様に記載し、署名をすること）

(Supply similar information and signature for third and subsequent joint inventors.)

Japanese Language Declaration

	Full name of third joint inventor, if any Shinji HASHIMOTO
日付	Third Inventor's signature Date Shinji Hashimoto April 21, 2000
住所 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8588, Japan	Residence c/o FUJITSU LIMITED
国籍	Citizenship Japan
郵便の宛先	Post Office Address Same as above

	Full name of fourth joint inventor, if any
日付	Fourth Inventor's signature Date
住所	Residence
国籍	Citizenship
郵便の宛先	Post Office Address

	Full name of fifth joint inventor, if any
日付	Fifth Inventor's signature Date
住所	Residence
国籍	Citizenship
郵便の宛先	Post Office Address

	Full name of sixth joint inventor, if any
日付	Sixth inventor's signature Date
住所	Residence
国籍	Citizenship
郵便の宛先	Post Office Address

（第六またはそれ以降の共同発明者に対しても同様な情報および署名を提供すること。）

(Supply similar information and signature for third and subsequent joint inventors.)